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ABSTRACT

This report presents general criteria for authentic pedagogy, instructional activities rooted in a primary concern for high standards of intellectual quality, as well as more specific standards that can be used to judge the quality of assessment tasks, classroom lessons, and student performance. Examples are given of tasks, lessons, and student performance that score well on these standards. Evidence is also presented, based on a study of 24 restructured schools, that authentic pedagogy can result in improved student performance regardless of gender, race, ethnicity, or socioeconomic status. Three mathematics and social studies classes at each school, in grades 4 and 5, 7 and 8, and 9 and 10 were studied, and each teacher was asked to submit at least 2 assessment tasks with information on how the task was given to students. At least two samples of student work were received from 45% of students in the classes studied. Although all of these schools had made significant progress in structural reorganization, the quality of authentic pedagogy varied widely, as did student performance. It was apparent that some teachers have barely begun the journey toward higher quality instruction and assessment in spite of the demonstrated positive effects of authentic pedagogy and assessment on student achievement. Examples of tasks, lessons, and student performance are included. (Contains 3 tables and 1 figure.) (SLD)

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Issues in restructuring schools

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ISSUE REPORT NO. 8
SPRING 1995

Authentic Pedagogy: The Vision 1
- Criteria
- Connections to Constructivism
- Authentic Pedagogy

Authentic Pedagogy: Results of the Study 5
- Study Sample and Methods
- Variables and Scoring Procedures
- Findings
- Links to Student Performance
- Who Gets Authentic Pedagogy?
- Conclusions

Examples of Assessment Tasks, Lessons and Student Performance 9
- Tasks
- Lessons
- Student Performance
- High and Low Pedagogy: Contrasting Examples

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Authentic Pedagogy: Standards That Boost Student Performance

By Fred M. Newmann, Helen M. Marks and Adam Gamoran

A common theme runs through many of the current school-reform proposals: Students should become "active learners," capable of solving complex problems and constructing meaning that is grounded in real-world experience.

In this issue report, we offer a conception of instruction and assessment that remains consistent with active learning, but which also offers another critical element: It emphasizes that all instructional activities must be rooted in a primary concern for high standards of intellectual quality. We refer to this conception as authentic pedagogy.[1]

This report includes general criteria for authentic pedagogy, as well as more specific standards that can be used to judge the quality of assessments tasks, classroom lessons and student performance. We offer examples of tasks, lessons and student performance that score well on these standards.

We also offer new evidence, based on our study of 24 restructured schools, that authentic pedagogy pays off in improved student performance, and can improve student performance regardless of gender, race, ethnicity or socioeconomic status. The results were consistent across different grades and subjects in schools across the United States.

Until now, arguments in support of "authentic" teaching have often been made on philosophical grounds. We believe this study offers some of the strongest empirical justification to date for pursuing such a course.[2]

We hope this issue report advances thinking about the meaning of authentic pedagogy, supports its practice and suggests directions for further research to benefit school restructuring.

AUTHENTIC PEDAGOGY: THE VISION

Educators and reformers often worry that today's students spend too much of their time simply absorbing–and then reproducing–information transmitted to them. They fear that students aren't learning how to make sense of what they are told. Also, reformers often see little connection between activities in the classroom and the world beyond school. Students can earn credits, good grades and high test scores, they say, demonstrating a kind of mastery that frequently seems trivial, contrived or meaningless outside the school.

The reformers call instead for "authentic" achievement, representing accomplishments that are significant, worthwhile and meaningful.

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Table 1: Standards for Authentic Pedagogy and Student Academic Performance

Authentic Pedagogy

A. Assessment Tasks

Standard 1: Organization of Information: The task asks students to organize, synthesize, interpret, explain, or evaluate complex information in addressing a concept, problem, or issue.

Standard 2: Consideration of Alternatives: The task asks students to consider alternative solutions, strategies, perspectives, or points of view as they address a concept, problem, or issue.

Standard 3: Disciplinary Content: The task asks students to show understanding and/or use of ideas, theories, or perspectives considered central to an academic or professional discipline.

Standard 4: Disciplinary Process: The task asks students to use methods of inquiry, research, or communication characteristic of an academic or professional discipline.

Standard 5: Elaborated Written Communication: The task asks students to elaborate their understanding, explanations, or conclusions through extended writing.

B. Classroom Instruction

Standard 1: Higher Order Thinking: Instruction involves students in manipulating information and ideas by synthesizing, generalizing, explaining, hypothesizing, or arriving at conclusions that produce new meanings and understandings for them.

Standard 2: Substantive Conversation: Students engage in extended conversational exchanges with the teacher and/or with their peers about subject matter in a way that builds an improved and shared understanding of ideas or topics.

Standard 3: Deep Knowledge: Instruction addresses central ideas of a topic or discipline with enough thoroughness to explore connections and relationships and to produce relatively complex understandings.

Standard 4: Connections to the World Beyond the Classroom: Students make connections between substantive knowledge and either public problems or personal experiences.

Standard 6: Problem Connected to the World: The task asks students to address a concept, problem, or issue that is similar to one that they have encountered, or are likely to encounter, in life beyond the classroom.

Standard 7: Audience Beyond the School: The task asks students to communicate their knowledge, present a product or performance, or take some action for an audience beyond the teacher, classroom, and school building.

Authentic Academic Performance

Standard 1. Analysis

Mathematical Analysis: Student performance demonstrates and explains their thinking with mathematical content by organizing, synthesizing, interpreting, hypothesizing, describing patterns, making models or simulations, constructing mathematical arguments, or inventing procedures.

Social Studies Analysis: Student performance demonstrates higher order thinking with social studies content by organizing, synthesizing, interpreting, evaluating, and hypothesizing to produce comparisons/contrasts, arguments, application of information to new contexts, and consideration of different ideas or points of view.

Standard 2. Disciplinary Concepts

Mathematics: Student performance demonstrates an understanding of important mathematical ideas that goes beyond application of algorithms by elaborating definitions, making connections to other mathematical concepts, or making connections to other disciplines.

Social Studies: Student performance demonstrates an understanding of ideas, concepts, theories, and principles from the social disciplines and civic life by using them to interpret and explain specific, concrete information or events.

Standard 3. Elaborated Written Communication

Mathematics: Student performance demonstrates a concise, logical, and well articulated explanation or argument that justifies mathematical work.

Social Studies: Student performance demonstrates an elaborated account that is clear, coherent, and provides richness in details, qualifications and argument.

To confront this problem, schools are adopting a wide variety of active-learning techniques. In many classrooms where lectures once prevailed, students now take part in small-group discussions and cooperative learning exercises. They conduct independent studies, or make greater use of computers, video recording systems and other high-tech equipment. Their assignments take them out of the classroom to conduct community-based projects, such as oral histories, surveys or service learning programs.

Students exposed to such techniques often display greater enthusiasm and engagement. This heightened participation can lead some observers to conclude that higher-quality learning must be taking place.

But active learning alone offers no guarantee of high-quality student achievement. If a small group's task is to solve routine math problems, for example, and one student produces the answers for others to copy, little or no serious academic work is accomplished. Or if students survey community residents by simply asking short-answer questions written by a teacher and recording the answers, without reflecting on them, the opportunity to construct deeper meaning is lost.

Educators must ensure that new approaches to learning are aimed toward high intellectual standards. Otherwise, students' work, however "active," can remain shallow and intellectually weak.

Criteria

Consider the types of mastery demonstrated by successful adults, such as scientists, musicians, business entrepreneurs, novelists, nurses and designers. What key characteristics of their work justify calling their accomplishments authentic? And how do these accomplishments differ from the work that students complete in school?

We believe the answer lies in three criteria:

1 **Construction of Knowledge.** The people mentioned above face the challenge of constructing or producing meaning or knowledge, instead of merely reproducing meaning or knowledge created by others. Depending on their particular field, they may express this knowledge in different ways. For example, they may use words or symbols to write or speak about their findings. Or they might make things, such as furniture or a movie, or take part in performances for audiences, such as dance recitals or athletic contests.

Students taught within a conventional curriculum, on the other hand, are usually asked merely to identify the work that others have produced. They may be drilled on the differences between nouns and verbs, for example, or called upon to match authors with their works.

2 **Disciplined Inquiry.** For achievement to be authentic, it must be grounded in a field of knowledge, which usually includes facts, a specific vocabulary and a set of concepts and theories. Authentic performance in that field reflects an in-depth understanding of a particular problem or issue. That understanding is expressed through elaborate forms of communication that make use of written, visual and/or symbolic language to express ideas, nuances and details.

The conventional school curriculum, on the other hand, is more likely to require students to memorize isolated facts about a wide array of topics, and then use those facts to complete short-answer tests, which don't require deep understanding or elaborate communication.

3 **Value Beyond School.** Authentic achievement has aesthetic, utilitarian or personal value beyond merely documenting the competence of the learner. Successful adults engage in a wide variety of activities aimed at influencing an audience, producing a product or communicating ideas, from writing letters to developing blueprints to speaking a foreign language.

Achievements of this sort have special value that is missing from tasks, such as spelling quizzes or typical final exams, which are contrived only for the purpose of assessing knowledge. The oft-heard cry for "relevant" or "student-centered" curriculum is, in many cases, a less-precise expression of this desire that student accomplishments should have value beyond measuring success in school.

According to our conception, the most authentic achievements must meet all three of these criteria. Students might, for example, tackle a calculus problem that requires construction of knowledge and disciplined inquiry; but if the solution has no value except to prove that the students can solve calculus equations, its authenticity is diminished.

Likewise, a student who writes a letter to the local newspaper editor commenting on welfare reform may be constructing knowledge to produce discourse with value beyond school. But if the student's analysis is shallow or based on significant errors, it doesn't qualify as disciplined inquiry.

While our concept of authentic academic achievement demands that all three of these standards be met, this doesn't mean that all instruction and assessment activities must always fulfill all three standards. In some cases, repetitive practice or memory drills might help students build the knowledge and skills that can later serve as the basis for authentic performance. The point is not to abandon all traditional schoolwork, but to keep authentic achievement clearly in view as the ultimate goal.

Connections to Constructivism

A vision of learning as an active process jibes in many ways with the "constructivist" perspective now gaining favor among many educators. Our criteria for authentic achievement reflect both similarities to, and differences from, constructivist ideas.

Constructivism includes different points of view, but most share certain assumptions: Learning takes place as students process, interpret and negotiate the meaning of new information. This is heavily influenced by the student's prior knowledge, and by the values, expectations, rewards and sanctions that shape the learning environment. Students' assimilation of new information depends heavily on whether that information helps them explain, or meaningfully extend, their past experience. Even an apparently simple task, such as learning the spelling of a word, involves this complex mental process.

Under constructivism, teachers are called upon to nurture this process by leading students to engage in higher-order thinking, not just rote learning of superficial information. This means, in part, that teachers should offer students opportunities to process information through written and oral expression, as well as other avenues such as drawing, building or dancing. Without expression, students' efforts to make and negotiate meaning will be stifled.

Constructivism also calls for teachers to abandon the primary role of "dispenser of information and truth." Instead, a teacher should strive to be a coach, guide and mentor who inspires students to take on the work of learning. Teachers should engage students in a "cognitive apprenticeship," to be carried out in an atmosphere of mutual trust, collaboration and high expectations.

Our "construction of knowledge" criterion is consistent with the constructivist view of the student as a meaning-making person who continuously weighs new information against prior experience. But our vision goes further. Authentic performance occurs when the student reaches beyond imitation or reproduction of information, and analyzes or interprets that information to solve a problem that can't be solved by information retrieval alone.

We also add the criterion of disciplined inquiry, which requires a student to demonstrate in-depth understanding using substantial knowledge from an authoritative field. Constructivism, on the other hand, doesn't necessarily require that a student's construction of knowledge conform to knowledge considered authoritative by others.

This doesn't mean that disciplined inquiry creates a foolproof path to "truth." But disciplined inquiry does offer standards that help establish some ideas as intellectually more worthy than others.

The constructivist perspective is clearly consistent with our "value beyond school" criterion. We certainly agree that learning is more powerful when students can draw meaningful connections between their school work and their own experiences and situations.

Authentic Pedagogy

We define pedagogy as the combination of assessment and daily teaching practices used by a teacher. If teachers were to aim for authentic student performance according to the criteria we have described, then they would presumably create assessment tasks that called upon students to construct knowledge, through disciplined inquiry, which addressed problems that had some meaning beyond showing success in school. Teachers also would create lessons that helped students to develop proficiency in these kinds of tasks.

In our studies of authentic pedagogy in restructured schools, we developed a more specific set of standards for ascertaining the extent to which teachers actually used authentic assessment tasks and taught authentic lessons. In the section that follows, we see how the standards were used to evaluate lessons, tasks and student performance collected from restructured schools across the United States.

Table 2

AUTHENTIC ACHIEVEMENT	AUTHENTIC ASSESSMENT TASKS	AUTHENTIC INSTRUCTION	AUTHENTIC STUDENT PERFORMANCE
CONSTRUCTION OF KNOWLEDGE	Organization of Information	Higher Order Thinking	Analysis
	Consideration of Alternatives		
	Content		
DISCIPLINED INQUIRY	Process	Deep Knowledge	Disciplinary Concepts
	Elaborated Written Communication	Substantive Conversation	Elaborated Written Communication
VALUE BEYOND SCHOOL	Problem	Connections to the World Beyond the Classroom	
	Audience		

This table shows how the 14 standards for authentic pedagogy and student academic performance, detailed in Table 1 on page 2, are linked across the three criteria described above.

AUTHENTIC PEDAGOGY: RESULTS OF THE STUDY

In studying the levels of authentic pedagogy, and its connection to student performance in restructured schools, we addressed three central questions:

1. QUALITY AND VARIABILITY–How much authentic pedagogy, as defined by our standards, is taking place in these schools? How much variation in the delivery of authentic pedagogy is there between teachers, schools, grade levels and subjects?

2. LINKS TO STUDENT ACHIEVEMENT–To what extent does authentic pedagogy contribute to authentic student performance?

3. EQUITY–To what extent are students from certain social and academic backgrounds more likely to receive authentic pedagogy? To what extent does authentic pedagogy have different benefits to students from different backgrounds? How much effect do differences in background have on authentic academic performance by students?

Samples and Methods

We collected data from 24 schools taking part in the School Restructuring Study conducted by the Center on Organization and Restructuring of Schools. Due to incomplete data from one middle school, however, this report on authentic pedagogy includes data from only 23 schools.

Center staff studied each school intensively for a year, with the goal of learning how schools' organizational features can contribute to authentic pedagogy and authentic academic performance, as well as to five other valued outcomes.[3]

The 24 schools–eight elementary, eight middle and eight high schools–were chosen after a nationwide search for schools that had made substantial departures from typical school organizational structures. Many of these schools had adopted such reforms as school-based governance councils, teacher teams with common planning time, heterogenous ability grouping of students, extensive use of small groups in instruction, and special programs to address the social and emotional needs of students. The schools were located in 22 districts in 16 states.

Limited resources prevented Center researchers from looking at every class and subject. Instead, we studied math and social studies classes at each school–in grades 4 and 5 for elementary schools, 7 and 8 for middle schools and 9 and 10 for high schools.

At each grade level, researchers consulting with each school selected three classes in each subject. At least one selected class was taught by a teacher who was clearly involved in the school's reform process. The classes also were chosen to reflect the range of student achievement within the entire grade.

Center researchers made two week-long visits to each school and observed each of the selected classes four times during the school year. This study of authentic pedagogy includes data from 504 observed lessons.

We asked each observed teacher to submit at least two assessment tasks. We asked for tasks that would provide valid and important indicators of students' proficiency and understanding of the subject matter.

We also asked the teachers to complete a short questionnaire describing the conditions under which the task was given to students. This study examined 234 assessment tasks; 65 percent of the teachers provided at least two tasks.

We also asked for a complete set of student work completed in response to the assessment tasks each teacher submitted. Each student also was asked to complete a short questionnaire describing his or her perceptions about the task and the work.

We received at least two samples of work from 45 percent of the students in our study. All together, this study includes data collected

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from 2,128 students and 3,128 samples of student work.

Variables and Scoring Procedures

Using the specific standards listed in Table 1 on page 2, we devised scales for measuring authentic pedagogy and authentic student performance.[4]

Center researchers gave each observed class a score on each of the four standards for instruction. The scale for each item ranged from 1 to 5, so scores could range from 4 to 20.

Each assessment task was scored by a Center researcher and a specially trained teacher currently teaching the same subject. The tasks were scored on each of the seven standards, some on a scale of 1 to 3, others from 1 to 4. If the researcher and teacher arrived at different scores, they discussed the task and reached a consensus.

The scores awarded for each of the two tasks submitted by each teacher were averaged, resulting in a final score that could range from 7 to 23.

To create a score for authentic pedagogy, we combined the scores for instruction and assessment, creating a range of possible scores from 11 to 43.

To judge student performance, we used a similar scale based on the three standards listed in Table 1 on page 2. Teachers trained by Center researchers gave each sample of

Table 3: Levels of Authentic Pedagogy and Student Authentic Academic Performance by Grade and Subject

		ELEMENTARY		MIDDLE		HIGH		TOTAL	
		Pedagogy[1]	Performance[2]	Pedagogy	Performance	Pedagogy	Performance	Pedagogy	Performance
MATH	Mean Score	22.5	6.0	20.7	6.2	20.3	6.0	21.2	6.1
	Number of Students or Teachers	22	437	21	385	21	294	64	1116
SOCIAL STUDIES	Mean Score	22.0	6.1	22.2	7.3	22.4	6.9	22.2	6.7
	Number of Students or Teachers	24	531	20	403	23	348	67	1282
TOTAL	Mean Score	22.2	6.1	21.4	6.7	21.4	6.5	21.7	6.4
	Number of Students or Teachers	46	968	41	788	44	642	131	2398

ALL SCHOOLS

	Pedagogy[3]	Performance[4]
Mean Score	21.4	6.3
Highest and Lowest Scores	16.7, 27.3	4.5, 8.0
Number of Schools	23	23

[1] Class scores. [2] Student scores. [3] Class scores averaged for each school, math and social studies combined.
[4] Student scores averaged for each school, math and social studies combined.

student work a score ranging from 1 to 4 on each of the standards, creating a range of possible scores of 3 to 12.[5]

The scores for the samples from each student were averaged to determine the student's final score. For some aspects of our analysis, we averaged individual student scores together to create mean scores for the whole class.[6]

Since a student's background can affect achievement, we also used measures of student academic and social background. The academic measure was based on tests–of basic knowledge in math, and of reading and writing for social studies–which we asked students to complete in the fall of the observation year. These tests were made up of items from the National Assessment of Educational Progress (NAEP) for the appropriate grade level. About 85 percent of the students completed the tests.

The measure of social background was based on surveys in which students reported their gender and race, whether they were of Hispanic background, and their household socioeconomic resources. Secondary students also reported their parents' levels of education.

To examine the link between authentic pedagogy and student performance, we used a statistical technique known as Hierarchical Linear Modeling (HLM). This allowed us to estimate the contribution authentic pedagogy made to differences in student performance across the sample. The HLM estimate describes the effect of authentic pedagogy beyond the influence of students' social and academic background, and beyond the unique, unmeasured influences of each school.

FINDINGS

All of the schools in this study had made clear progress in organizational restructuring. Nevertheless, the quality of authentic pedagogy in these schools varied widely. Our researchers found some schools with many examples of high-quality work, and others with very few.

Table 3 on page 6 indicates the overall levels of authentic pedagogy, and authentic student performance, we observed. These numbers show that even the most successful teachers and schools scored far below the highest level of our proposed standards.

Likewise, we found significant variation in student performance. In some grades and subjects, the most successful student scored four times as many points as the least successful student. Also, as with teachers and schools, even the most successful students scored well below the upper end of our scale.

We think these numbers suggest both good and bad news. The good news is that some teachers and schools have been at least reasonably successful at delivering authentic pedagogy. But the bad news is that overall levels of authentic pedagogy remain low, even in highly restructured schools. Clearly, some teachers and schools have barely begun the journey toward higher quality instruction and assessment.

Links to Student Performance

When we studied the factors related to authentic student performance, we found that authentic pedagogy appears to boost student performance in all three grade levels and in both math and science.

We also computed the impact of different levels of pedagogy on different types of students: for example, a white male of average socioeconomic status whose score on the NAEP test was at the mean. In a class with average pedagogy, such a student would score 6.1 on our scale of 3 to 12. By comparison, that "average" student would score 5.4 in a class with low pedagogy, and the same student would have scored 6.8 in a class with high pedagogy.

These may seem like small improvements, but they translate to substantial improvements in students' rankings compared to their peers. Regardless of race or gender, an average student would move from the 30th to the 60th percentile if he or she received high authentic pedagogy instead of low authentic pedagogy.

Figure 1 on page 8 shows similar results for "average" students of different gender and ethnicity in classes with low, average and high pedagogy. This illustrates the major contribution that authentic pedagogy can make to students' academic performance.

This point is illustrated further by the examples of student work on page 12 of this issue report.

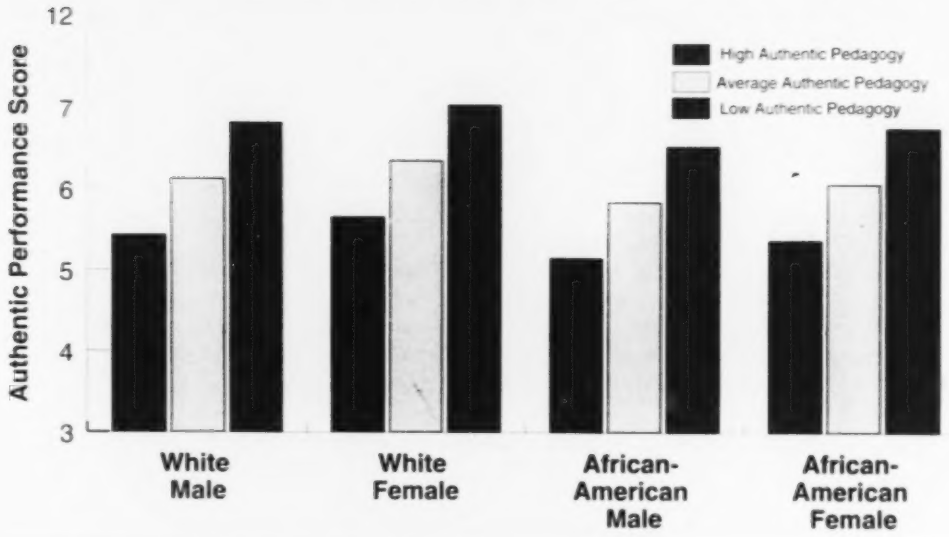
Who Gets Authentic Pedagogy?

In our view, schools should promote authentic student achievement among all students. There should be no discrimination against students from disadvantaged backgrounds. This means providing the same access to authentic pedagogy for richer students and poorer students alike. And all students should gain, not just those who already achieve at high levels.

When we studied the factors related to authentic student performance, we found that authentic pedagogy appears to boost student performance in all three grade levels and in both math and science.

Figure 1:

Authentic Academic Performance for "Average" Students Receiving Low, Average or High Authentic Pedagogy



Overall, we found that students from different social backgrounds did have equal access to authentic pedagogy. However, students who started out with higher achievement, as measured by our NAEP-based tests, were slightly more likely to receive authentic pedagogy. Because authentic pedagogy builds on what students know and can do, there may be some tendency for teachers to use it more with higher-performing students. Also, while the restructured schools in the study had substantially reduced the use of ability grouping, most hadn't eliminated it, which also may have influenced these results.

As to the effects of authentic pedagogy on students with different backgrounds: We found that authentic pedagogy helps all students substantially. However, it provides an extra boost for students already performing at higher levels. In other words, if a low-achieving student moved from a class low in authentic pedagogy to a class high in authentic pedagogy, that student's performance would be enhanced significantly. But a high-performing student making the same move would improve even more.

We did find gaps in authentic performance between students of different backgrounds: African Americans posted lower scores than whites, and girls scored significantly higher than boys. But we found that these inequalities were no greater, and could possibly be less, than those already evident in traditional assessment techniques, such as the NAEP. Thus, while inequalities have not been eliminated, the use of authentic measures of student performance doesn't appear to worsen this problem. At least in this sample of restructuring schools, the use of these performance standards did not widen any gaps attributed to social background.

Conclusions

Previous research has demonstrated the difficulty of making U.S. schools more academically rigorous, and our study paints a similar picture. The overall level of authentic pedagogy we observed, even in a sample of highly innovative schools, fell well below the upper reaches of the scoring standards we have proposed. There is good news, however: Some teachers and students have made considerable progress toward meeting such standards.

This study provides strong evidence that authentic pedagogy pays off in improved academic achievement. The limits in the design of this study may cast some doubts on whether we have established a clear cause-and-effect relationship. And we have not shown that reforms that set out to emulate these standards will boost student performance. But the robust relationship between authentic pedagogy and student performance suggests that students would benefit if all schools worked toward these standards.

It's uncertain whether all schools can distribute authentic pedagogy as equitably as the restructured schools in our study have managed to do. But the study shows that significant progress toward equity can be accomplished.

Neither gender, race, ethnicity or socioeconomic status significantly affected the impact of authentic pedagogy on students. While disparities between different groups remain, using the standards to evaluate the quality of pedagogy and student performance creates no additional roadblocks to the important work of closing those performance gaps.

EXAMPLES OF ASSESSMENT TASKS, LESSONS AND STUDENT PERFORMANCE

As part of the study of 24 restructured schools, staff of the Center on Organization and Restructuring of Schools translated the three criteria for authentic pedagogy into more specific standards for assessment tasks, instruction and student performance. A complete list of these standards is found in Table 1 on page 2.

These standards can provide more specific guidance on classroom practice, by helping educators to assess the level of authentic academic work found in assessment tasks, daily lessons and students' responses to those tasks.

Here we present examples of tasks, lessons and student work that received high scores on a few illustrative standards. We have included examples in math and social studies, the curricular subjects our study addressed.

The examples are drawn from "A Guide to Authentic Instruction and Assessment: Visions, Standards and Scoring," by Newmann, Secada and Wehlage, which is to be published by the Center in June. The Guide includes many more examples, as well as additional information on how educators might pursue authentic assessment and instruction.

Copies of the Guide may be ordered using the mail-in form that follows page 12.

TASKS

Mathematics Example for Standard 1, Organization of Information:

Students in 4th and 5th grade were given the following task involving measurement, fractions, and fraction computation:

> We are making a bookcase to hold our new stereo. We need to have 3 shelves. The top shelf must contain 3 compartments; the second shelf, 2 compartments; and the bottom shelf, 1 compartment. We also have 6 boards that are 60" long, 2.5' wide, and 1" thick. Draw a diagram of what the shelf will look like when finished. Using fractions, show how you will cut the boards to make compartments.

This task scored high on "Organization of Information" because it could not be completed successfully unless students organized and interpreted the information presented into a new form. They had to take information on the number of shelves and compartments needed, the number of boards available with specific dimensions, and put this together in a design that would work mathematically (for example, the dimensions indicated in their bookshelf could not exceed the length of boards that were given). The teacher's grading and comments on student work showed that she expected students not only to label the different parts of the shelves, but to show that the measurements and fractional parts added up correctly.

Social Studies Example for Standard 4, Disciplinary Process:

A 4th/5th grade social studies class was involved in a year-long study of their community that included a unit on urban geography. Working in small groups, students were given the following task:

> First, select one of the neighborhoods marked on the city map. Second, identify its current features by doing an inventory of its buildings, businesses, housing, and public facilities. Also, identify current transportation patterns and traffic flow. From the information made available, identify any special problems this neighborhood has such as dilapidated housing, traffic congestion, or a high crime rate.
>
> Third, as a group consider various plans for changing and improving your neighborhood. If there is a special problem, how will you address it? What kinds of businesses, if any, do you want to attract? What kind of housing do you want? Will there be parks and other recreation facilities? What transportation patterns do you want? Do you want to make the block attractive to different groups of people such as senior citizens and young people?
>
> After deciding on a plan, draw and label it on the overlay provided with your map. Based on what you know about urban geography, indicate in your narrative one possible plan that you rejected, and say why it was rejected. Indicate how your plan will promote the neighborhood features you want.

The above task scored high on "Disciplinary Process" because it required students to think in some of the same ways as urban planners and geographers. This involved collecting data systematically through observation and recording and using this data as a basis for making generalizations about patterns in human behavior and the specialized uses and functions of space within a community.

LESSONS

Mathematics Example for Standard 4, Connections to the World Beyond the Classroom

In a 4th grade math class, students were to figure the costs of running

a household on a monthly budget of $2,000.

The teacher gave students a list of typical categories for expenses including rent, groceries, electricity and telephone service. Students were to determine actual costs by looking through a real estate guide for rent, choosing groceries from a local store's price list, etc. They constructed budgets by examining the materials and discussing the possibilities with one another.

There was evidence that students derived personal meaning from this lesson. For example, in looking at rental guides, two boys expressed surprise to find that some buildings did not allow pets. "How about the bus line?" one asked. "Bus line? We don't need a bus line, we have cars," said the other.

In another group, a girl chose a cheaper apartment without a dishwasher because she did not mind doing dishes by hand. In a third group, two other girls, after deciding to rent a $740 apartment, changed their minds because they felt it was too expensive.

This lesson scored high on "Connections to the World Beyond the Classroom." Students had to look at real costs and make priority choices in creating their budgets.

For instance, they could lower rent by finding cheaper apartments, sharing with more people, or giving up luxuries. The activities linked mathematical content to decisions that students would need to make in life beyond school.

Social Studies Example for Standard 1, Higher Order Thinking

In an 8th grade social studies lesson, students were asked by the teacher to consider the impact on a community when workers were laid off from work. (This issue was raised in light of recent layoffs from an airplane manufacturer, a major business in the community.)

The teacher began by helping the students to define a series of terms related to the issue. These included "layoff," "salary," "fringe benefits," "unemployment rate," "unemployment compensation," and "local economy." The teacher provided the class with information about the local economy of their community (city/county). The teacher also provided data for two other communities of similar size, but which had somewhat different types of businesses and employment.

The teacher asked the students to break into small groups to examine the information they had been given and to answer the question, "What generalizations can you state about each of the local economies?"

After giving the students a few minutes to examine the data, the teacher asked each group to report their generalizations. Several noted that their own community had many more kinds of employment than the other communities. One was characterized as a "two industry" city–shipping and tourism. One was characterized as a "one industry city" based largely on the military, but with a growing unemployment problem.

The teacher asked students to speculate about what was happening in that community as a result of cutbacks in military spending by the federal government. The class agreed that generally a community was better off if it was not too dependent on any one area for business and employment.

After some discussion, the students developed the following generalization: Layoffs mean the loss of salaries and that means less spending in a community. One student said, "People who are buying cars and houses might not be able to make their payments even though they are getting unemployment compensation. Car dealers might go out of business because people would not have the money to buy new cars."

The class also discussed the fact that not only would the local economy lose the salaries of laid-off workers, but the loss of fringe benefits such as health insurance could have a major impact. One student said, "When people don't have health insurance they don't go to doctors and then their health gets worse."

This lesson scored high on "Higher Order Thinking" because almost all of the students took part in analyzing information to develop hypotheses, generalizations and comparisons among the three local economies.

STUDENT PERFORMANCE

Math example for Standard 2, Disciplinary Concepts

This problem was posed to a class of 8th graders.

> The Tortoise and the Hare. The hare challenged the tortoise to the best two out of three races. In each case, the race was to be 100 meters.
>
> *Race 1:* The tortoise left the starting line and "sprinted" at the rate of 4 meters per minute. Twenty-five minutes later, the Hare left the starting line. How fast did the Hare have to run in order to overtake the tortoise? Who won the race?

One student responded, "The tortoise won because he had crossed the finish line as the hare was just leaving the starting gate. No way for the hare to catch him." The student had sketched a distance-time graph showing that at 25 minutes, the tortoise had already gone 100 meters. The hare's graph was a vertical line, and was labeled "impossible."

> *Race 2:* The hare left 8 minutes after the tortoise. The hare ran at the rate of 20 meters per minute. The tortoise still "sprinted" at 4

meters per minute. Draw a graph that shows the progress of the race. Use the same grid for both the tortoise and the hare. The horizontal axis should show the time; the vertical axis should show the distance. Who won the second race?

The same student responded: "The hare." On the attached page, the student drew a graph plotting two straight lines with appropriate slopes. She labeled each line, and highlighted the 100-meter mark on the y-axis. Since .he tortoise's line crossed through the 100-meter mark before the hare's line, she concluded that the hare won.

Race 3: The hare left 5 minutes after the tortoise. After the Hare ran for 3 minutes, it stopped for a 15-minute rest and then resumed the race. The tortoise still "sprinted" at 4 meters per minute and the hare ran at 20 meters per minute. Make another graph to show the progress of each. Who won the race?

The same student responded, "They get there at the same time, it's a tie." Once again, she had drawn a graph, clearly labeling the lines corresponding to the tortoise and the hare. By showing how both lines crossed the 100-meter mark at the same time, she was able to show that both animals crossed the finish line together.

This student's work scored high on "Disciplinary Concepts" because her explanations of why the tortoise or hare won (or tied), and her labeling of graphs that represented the progress of the race in each story, demonstrated exemplary mathematical understanding of the relationships of the concepts of distance, time and rate, and of how graphs can be used to represent these problems.

Social Studies Example for Standard 3, Elaborated Written Communication

This task called on 12th graders to develop a "position paper" on a controversial issue. The following excerpts are from one student's somewhat longer paper justifying U.S. intervention in the Persian Gulf.

There have been numerous instances when the world has witnessed what happens when aggressors are not stopped. Let us look back to 1935 when Mussolini decided to invade and annex Ethiopia. Ethiopia's emperor appealed to the League of Nations, but nothing was done.

Soon afterwards, in 1936, Adolf Hitler re-occupied the Rhineland, thereby violating the Treaty of Versailles. Again, the world ignored these blatant displays of hostility and power....

When Emperor Hirohito of Japan attacked Manchuria in 1931, and then China in 1937, he was simply scolded by the League of Nations....

In 1938, Hitler united Austria and Germany. The world protested, but then gave in to Hitler who said he only wanted to unite the German people. Then, Hitler took the Sudentenland from Czechoslovakia. As before, concessions were made to appease the aggressor....

In all the examples of unchecked aggression, the moral is the same. The school bully who demands lunch money from other children will not stop until someone stands up to him. If the bully is allowed to harass, intimidate, and steal from other children, it is giving him silent permission to use power against the weak....

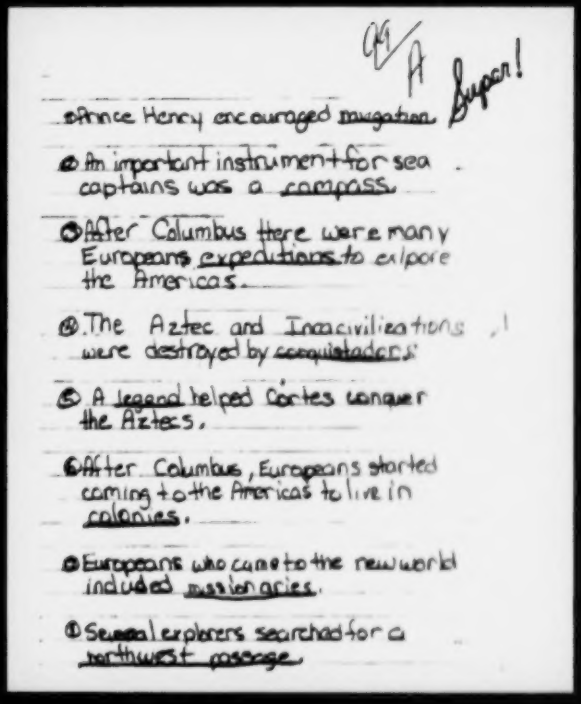
Those who complain about the United States acting as a "police nation" would do well to remember that Desert Storm has been a United Nations effort, not solely a U.S. effort. The U.N. Security Council condemned Iraq's invasion and annexation of Kuwait, as did the Arab League. The U.N. imposed mandatory sanctions, forbidding all member states from doing business with Iraq. The European Community, the U.S. and Japan froze Kuwaiti assets. The U.S., Britain, France, Canada, Australia, West Germany, the Netherlands, and Belgium positioned naval vessels to enforce a blockade.... Clearly, the United States acted in accordance with the United Nations and with the support of its many members.

There is a time for peace and a time for war. War is a horrible situation, but it is imperative that countries learn to recognize when it is necessary. Perhaps some day the world will be able to solve its problems without violence. In the meantime, we would endanger international security to allow people like Saddam Hussein and his terrorist goons to threaten and overpower independent countries such as Kuwait....

The paper scored high on "Elaborated Written Communication" because two main points were argued and supported in some detail: Aggression should be stopped soon or it will lead to a chain of abuses; and the U.S. acted with international support in the Persian Gulf war.

HIGH AND LOW PEDAGOGY: CONTRASTING EXAMPLES

Example A: Low Authentic Pedagogy



99/A Super!

since Henry encouraged navigation

1. An important instrument for sea captains was a compass.
2. After Columbus there were many Europeans expeditions to explore the Americas.
3. The Aztec and Incas civilizations were destroyed by conquistadors.
4. A legend helped Cortes conquer the Aztecs.
5. After Columbus, Europeans started coming to the Americas to live in colonies.
6. Europeans who came to the new world included missionaries.
7. Several explorers searched for a northwest passage.

Example B: High Authentic Pedagogy

The sea turtles are killed for meat and leather, their eggs are taken for food. Their nesting sites are destroyed by man, so they can develop buildings and other places to visit. On some of the beaches they offer boat rides. The boats are located on the sand when they are not being used. The owners are not aware that the boats are resting on top of the sea turtle eggs and killing them.

The sea turtles are classified under two families. The Leatherback and the Regular Sea turtles. The Leatherback Sea Turtles are the largest of the two.

There are alot of unanswered questions today relating to the sea turtles. Despite the explosion of sea turtle research, scientist are frustrated. One of the scientist was quoted saying "I don't know any branch of science where we have applied so much effort and learned so little". "We don't know where each species grows to maturity, or how long it takes them to grow up, or what the survival rates are".

Some of the answers can now be researched because the U.S. and 115 other countries have banned import or export of sea turtle products. By spreading the word and joining support groups, we can also slow down the process.

We can all help by keeping the beaches free of trash and pollution. We can make suggestions to the beach control unit to keep pleasure boating down and only allow it in certain areas where hatching does not take place. Sea turtles have a one percent chance of living to maturity, unlike you and I. We have a greater chance of living a very long life.

These examples of student work, collected during the study of restructured schools conducted by the Center on Organization and Restructuring of Schools, demonstrate the impact that different levels of authentic pedagogy can have on student achievement.

The two examples of student work reproduced here were created by students with identical scores on our NAEP-based test of previous academic success.

Example A: A class of 5th graders was assigned to copy a set of questions about famous explorers from a work sheet, and to add the correct short-answer responses in the appropriate spots. The class spent a total of 30 minutes on this exercise, which the teacher described as "very consistent" with what is typically emphasized in the class.

Even though the student whose work is shown here received a near-perfect 99 on this assignment, little authentic student achievement is evident. The student is simply reproducing specific bits of information that previously were supplied by the teacher. There is no analysis or interpretation of these facts, nor any elaborated communication.

This task scored a 7 on our scale of authentic assessment, which ranges from a low of 7 to a high of 23. The student's work scored 3.5 on our scale of authentic student achievement, which ranges from a low of 3 to a high of 12.

Example B: A class of 5th and 6th graders was assigned to research and write a paper on ecology. This assignment occupied 40 hours of class time during the 12-week grading period. Each student produced several drafts of the paper, and met individually with the teacher several times to discuss the drafts. Students also received 11 pages of written directions on how to research, organize and write the paper, including a step-by-step checklist for completing the assignment, a sample outline and sample bibliography entries. The paper counted for 75 percent of the student's grade for the 12-week period.

The student whose work is excerpted here submitted seven pages of text, including an introduction to the topic she chose–sea turtles–an overview of issues to be discussed in the paper, detailed information on sea turtle biology drawn from several sources, and information on hazards faced by sea turtles in Costa Rica. Another section entitled "What you can do to help" included a phone number to call for more information, and advice on how to write the U.S. government to push for more protection of turtles.

This task scored a 19 on our scale of 7 to 23. The student's work scored a 10 on our scale of 3 to 12.

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Fred M. Newmann, Walter G. Secada, Gary G. Wehlage

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Endnotes

[1] The concepts of authentic achievement and standards for pedagogy are explained in greater detail, and illustrated with examples, in Newmann, F. M., Secada, W. G., & Wehlage, G. G. (1995). *A guide to authentic instruction and assessment: Vision, standards, and scoring*. Madison, WI: Wisconsin Center for Education Research. This guide may be ordered with the order blank that follows page 12 in this issue report.

[2] The empirical findings from this study are presented in greater detail in Newmann, F. M., Marks, H. M., & Gamoran, A. (1995). *Authentic pedagogy and student performance*. Madison, WI: Wisconsin Center for Education Research. Copies of this paper are available through the WCER Document Service, 1025 W. Johnson Street, Room 242, Madison, WI 53706. Price is $6 per copy, including postage and handling, for orders shipped to the United States and Canada. For orders to other countries, please call the Document Service at (608) 263-4214.

[3] The other five outcomes we studied were equity for students; empowerment of teachers, parents and school administrators; sense of community among staff and students; reflective professional dialogue; and accountability. Results from the full study will be available from the Center in early 1996.

[4] For a detailed explanation of the scoring scales and standards, see Newmann, Secada, & Wehlage (1995).

[5] We are grateful to the 47 teachers from school districts in and around Madison, Wisconsin who took part in scoring tasks and student work for this study.

[6] About 25 percent of the rated lessons also were observed by a second Center researcher who independently rated them. The overall level of agreement between the two raters is estimated as a correlation of .78. About 37 percent of the student work samples were scored a second time by another teacher. The two scores were the same 54 percent of the time, and 92 percent were within one point.

CENTER MISSION

The Center on Organization and Restructuring of Schools studies how organizational features of schools can be changed to increase the intellectual and social competence of students. The five-year program of research focuses on restructuring in four areas: the experiences of students in school; the professional life of teachers; the governance, management and leadership of schools; and the coordination of community resources to better serve educationally disadvantaged students.

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Authentic Pedagogy: Standards That Boost Student Performance

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